



FCC ID: YAI-TONAL  
Report No.: T180614D03-RP4

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## FCC 47 CFR PART 15 SUBPART C

&

## INDUSTRY CANADA RSS-210

### TEST REPORT

For

**Wireless Console Module**

**Model Number: Hercules**

**Trade Name: InnoComm Mobile**

*Issued to*

**InnoComm Mobile Technology Corp.**  
**3F, No. 6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu 30078, Taiwan**

*Issued by*

**Compliance Certification Services Inc.**  
**Wugu Laboratory**  
**No.11, Wugong 6th Rd., Wugu Dist.,**  
**New Taipei City 24891, Taiwan. (R.O.C.)**  
**Issued Date: September 18, 2018**

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部分複製。

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### **Revision History**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		September 18, 2018		Initial Issue	ALL	May Lin



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## 1. TEST RESULT CERTIFICATION

**Applicant:** InnoComm Mobile Technology Corp.  
FCC: 3F, No. 6, Hsin Ann Rd., Hsinchu Science Park,  
Hsinchu, Taiwan, 30078  
IC: 3F, No. 6, Hsin Ann Rd., Hsinchu, 30078, Taiwan

**Manufacturer:** InnoComm Mobile Technology Corp.  
FCC: 3F, No. 6, Hsin Ann Rd., Hsinchu Science Park,  
Hsinchu, Taiwan, 30078  
IC: 3F, No. 6, Hsin Ann Rd., Hsinchu, 30078, Taiwan

**Equipment Under Test:** Wireless Console Module

**Trade Name:** InnoComm Mobile

**Model Number:** Hercules

**Date of Test:** July 19 ~ September 13, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C & RSS-210 Issue 9	No non-compliance noted

### We hereby certify that:

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report. The test Report of full or partial shall not copy. Without written approval of CCS. Inc. The sample selected for test was production product and was provided by manufacturer.

Approved by:

Tested by:

Sam Chuang  
Manager  
Compliance Certification Services Inc.

Jerry Chuang  
Engineer  
Compliance Certification Services Inc.



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## 2. TEST SUMMERY

FCC Standard Section	IC Standard Section	Report Section	Test Item	Result
15.203	RSS-GEN §6.8	3	Antenna Requirement	Pass
2.1049	-	9.1	20 dB Bandwidth	Pass
-	RSS-GEN §6.7	9.1	Occupied Bandwidth (99%)	Pass
15.209 15.249(a)	RSS-210 §B.10	9.2	Band Edge and Fundamental measurement	Pass
15.249(d)	RSS-210 F.1	9.3	Conducted Bandedge And Spurious Emission	Pass
15.249(a)	RSS-210 §B.10	9.4	Radiation Bandedge And Spurious Emission	Pass
15.207(a)	RSS-GEN §8.8	9.5	Powerline Conducted Emission	Pass



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### 3. EUT DESCRIPTION

Product	Wireless Console Module							
Trade Name	InnoComm Mobile							
Model Number	Hercules							
Model Discrepancy	N/A							
Received Date	June 14, 2018							
Power Supply	1. Power by power supply (DC 15V) 2. Power by host system via USB							
Modulation Technique	GFSK							
Antenna Gain	Gain: 3.67dBi							
Antenna Designation	PCB Antenna							
Antenna Brand	Walsin							
Antenna Model	RFPCA5010-07							
Channel list	2401 ~ 2480MHz							
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
	1	2402	21	2422	41	2442	61	2462
	2	2403	22	2423	42	2443	62	2463
	3	2404	23	2424	43	2444	63	2464
	4	2405	24	2425	44	2445	64	2465
	5	2406	25	2426	45	2446	65	2466
	6	2407	26	2427	46	2447	66	2467
	7	2408	27	2428	47	2448	67	2468
	8	2409	28	2429	48	2449	68	2469
	9	2410	29	2430	49	2450	69	2470
	10	2411	30	2431	50	2451	70	2471
	11	2412	31	2432	51	2452	71	2472
	12	2413	32	2433	52	2453	72	2473
	13	2414	33	2434	53	2454	73	2474
	14	2415	34	2435	54	2455	74	2475
	15	2416	35	2436	55	2456	75	2476
	16	2417	36	2437	56	2457	76	2477
	17	2418	37	2438	57	2458	77	2478
	18	2419	38	2439	58	2459	78	2479
	19	2420	39	2440	59	2460	79	2480
	20	2421	40	2441	60	2461		

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.



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## **4. TEST METHODOLOGY**

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.249, IC RSS-210 and IC RSS-Gen.

### **4.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### **4.2 DESCRIPTION OF TEST MODES**

The EUT (Model: Hercules) had been tested under operating condition.

Channel Low (2402MHz), Channel Mid (2440MHz) and Channel High (2480MHz) were chosen for the final testing.

### 4.3 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT power by power supply (DC 15V) Mode 2: EUT power by host system via USB
Worst Mode	<input type="checkbox"/> Mode 1 <input checked="" type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: EUT power by power supply (DC 15V) Mode 2: EUT power by host system via USB
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)
Worst Polarity	<input checked="" type="checkbox"/> Horizontal <input type="checkbox"/> Vertical

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by power supply (DC 15V) Mode 2: EUT power by host system via USB
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

#### Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (Z-Plane and Horizontal) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.



#### 4.4 FCC PART 15.205 & RSS GEN SECTION 8.10 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



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## 5. INSTRUMENT CALIBRATION

### 5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 5.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	05/14/2018	05/13/2019
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	06/29/2018	06/28/2019
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	02/08/2018	02/07/2019
Double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
Loop Ant	COM-POWER	AL-130	121051	03/21/2018	03/20/2019
Pre-Amplifier	EMEC	EM330	060609	06/29/2018	06/28/2019
Pre-Amplifier	HP	8449B	3008A00965	06/29/2018	06/28/2019
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Power Meter	Anritsu	ML2495A	1149001	02/06/2018	02/05/2019
Power Sensor	Anritsu	MA2491A	30982	02/07/2018	02/06/2019
Signal Analyzer	R&S	FSV 40	101073	10/02/2017	10/01/2018

**Remark:** Each piece of equipment is scheduled for calibration once a year



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Conducted Emission Room #B					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
LISN	R&S	ENV216	101054	02/06/2018	02/05/2019
LISN	SCHWARZBECK	NSLK 8127	8127-541	02/09/2018	02/08/2019
EMI Test Receiver	R&S	ESCI	101203	11/02/2017	11/01/2018
CABLE	EMCI	CFD300-NL	CERF	07/03/2018	07/02/2019

**Remark:**

1. Each piece of equipment is scheduled for calibration once a year
2. N.C.R. = No Calibration Request.



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### 5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 1.4003
RF output power, conducted	+/- 1.1372
Power density, conducted	+/- 1.4003
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

**Remark:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.



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## 6. FACILITIES AND ACCREDITATIONS

### 6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



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## 7. SETUP OF EQUIPMENT UNDER TEST

### 7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### 7.2 SUPPORT EQUIPMENT

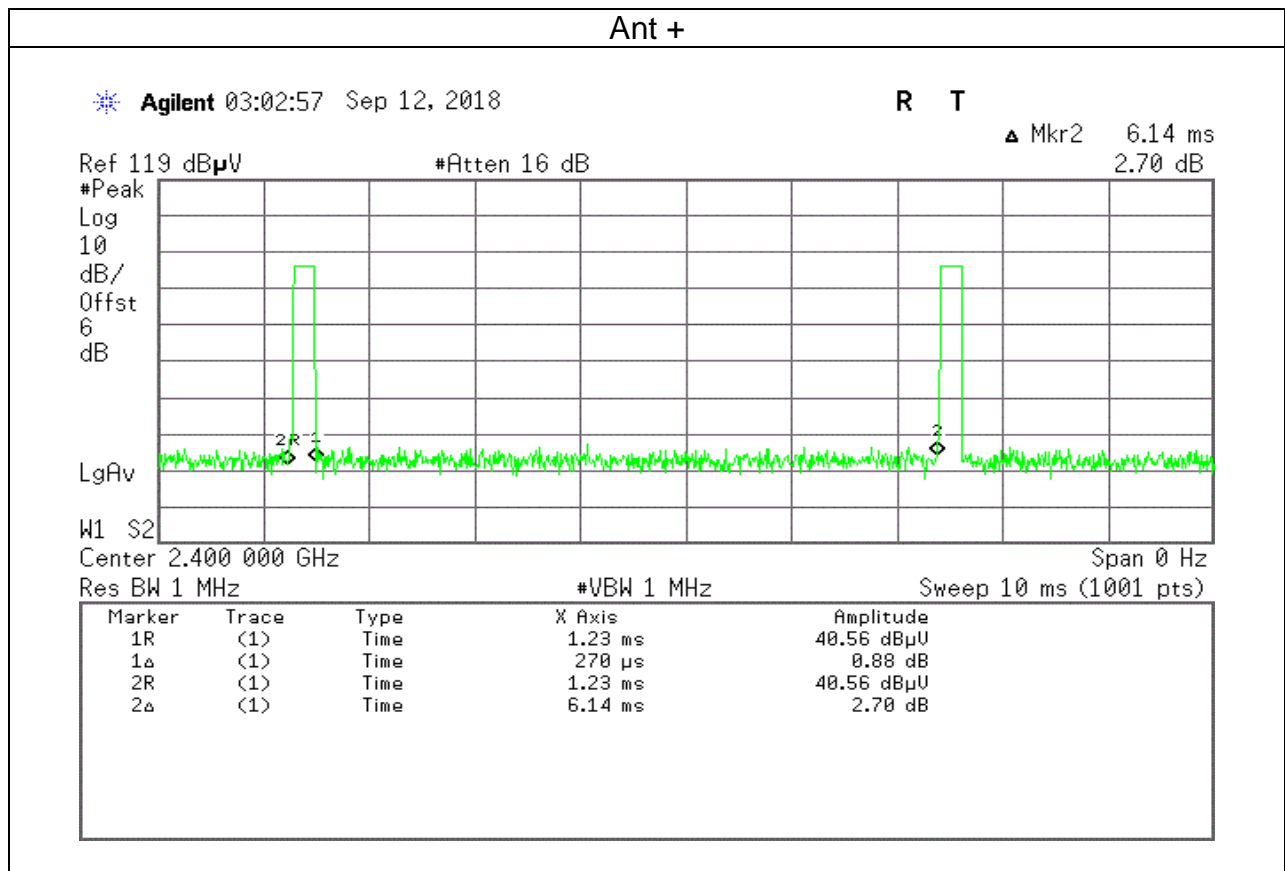
No	Device Type	Brand	Model	Series No.	FCC ID
1	DC Power Source	GWINSTEK	SPS-3610	N/A	N/A
2	NB(H)	Acer	Aspire 4320 series	N/A	QDS-BRCM1018
3	NB	Lenovo	TP00056A	N/A	PD97260HU

**Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 8. EUT DUTY CYCLE

Duty Cycle			
Configuration	TX ON (ms)	TX ALL (ms)	Duty Cycle (%)
Ant+	0.2700	6.1400	4.40%



## 9. FCC PART 15.249 & RSS-210 REQUIREMENTS

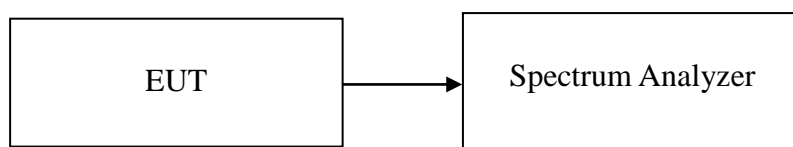
### 9.1 20dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

#### LIMIT

**20 dB Bandwidth** : For reporting purposes only.

**Occupied Bandwidth(99%)** : For reporting purposes only.

#### Test Configuration



#### TEST PROCEDURE

Test method Refer as ANSI 63.10:2013 clause 6.9.2.

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

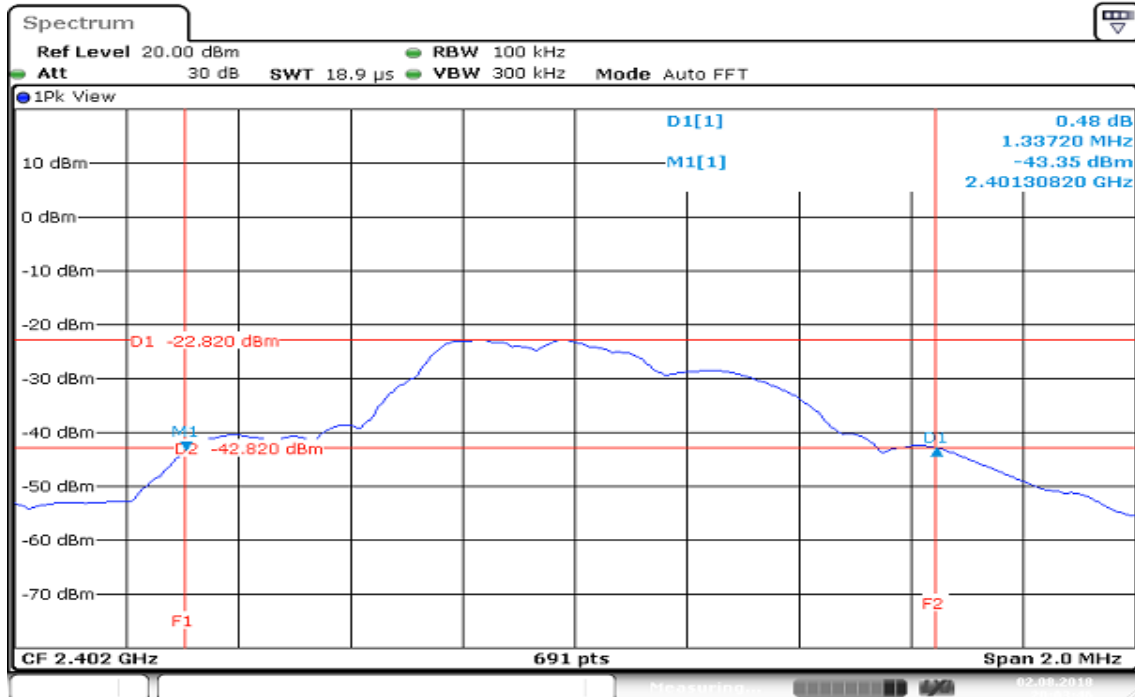
Test mode: ANT+ mode / 2402 ~ 2480MHz			
Channel	Frequency (MHz)	OBW (99%) (MHz)	20dB BW (MHz)
Low	2402	0.7901	2.4013
Mid	2440	0.7930	2.4393
High	2480	0.7409	2.4793



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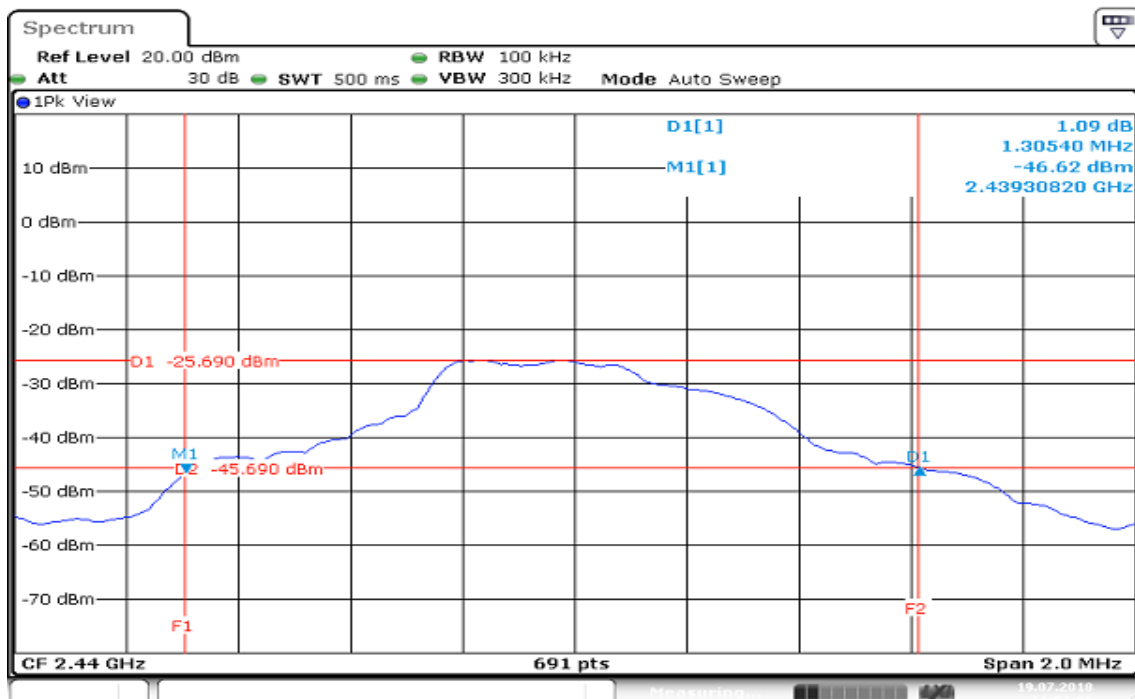
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## Test Plot 20dB BANDWIDTH (MHz) CH Low



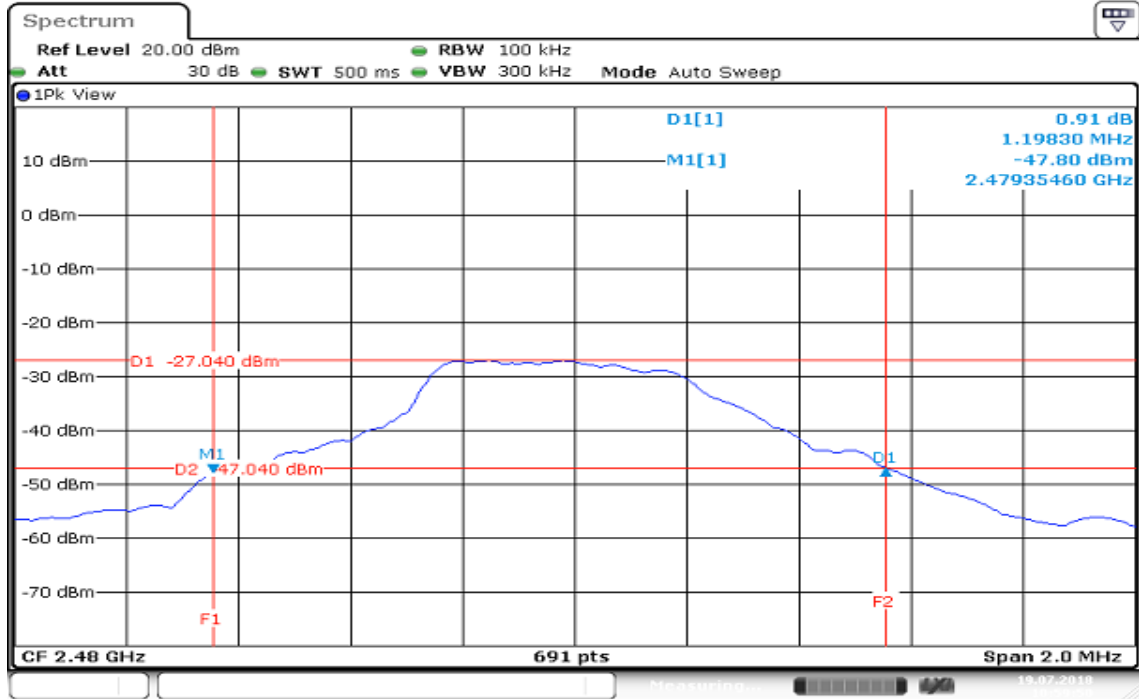
Date: 2 AUG 2018 20:03:46

## CH Mid



Date: 19 JUL 2018 11:01:06

## CH High

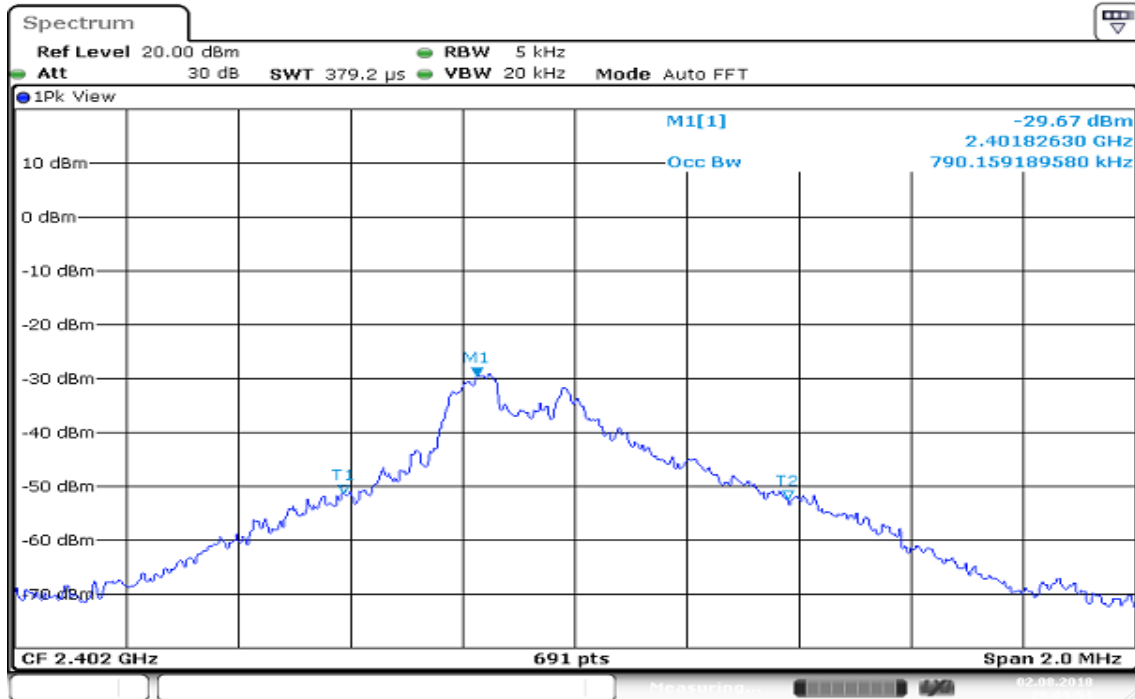


Date: 19 JUL 2018 10:59:50

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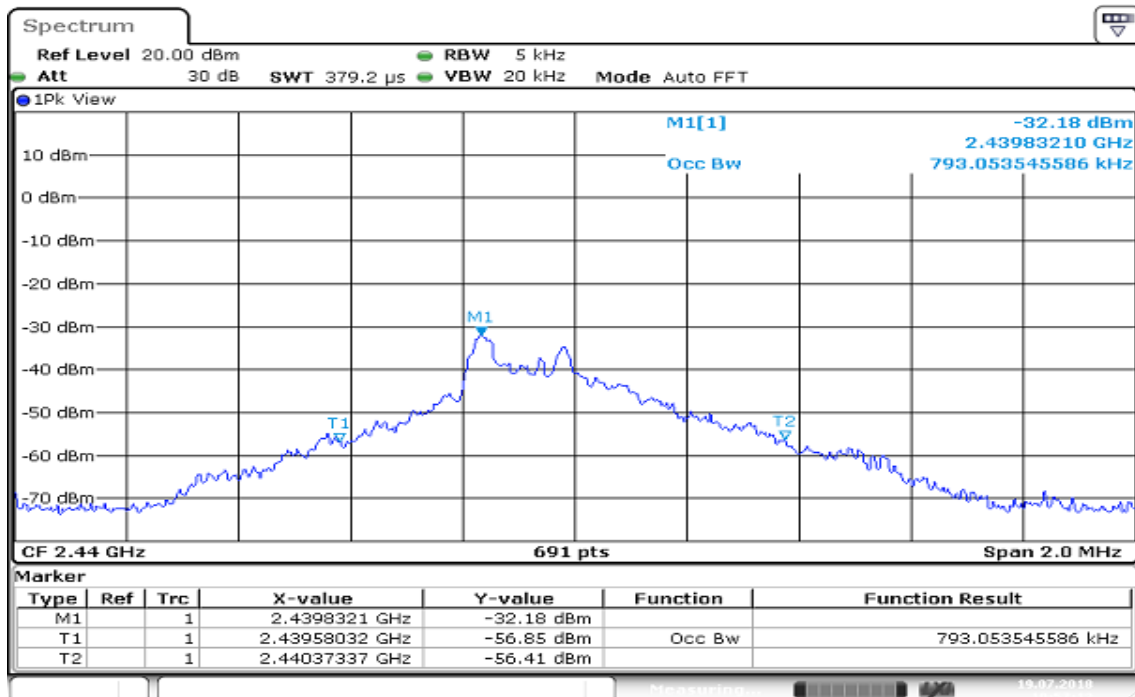
## BANDWIDTH (99%) (MHz)

### CH Low



Date: 2 AUG 2018 20:09:51

### CH Mid



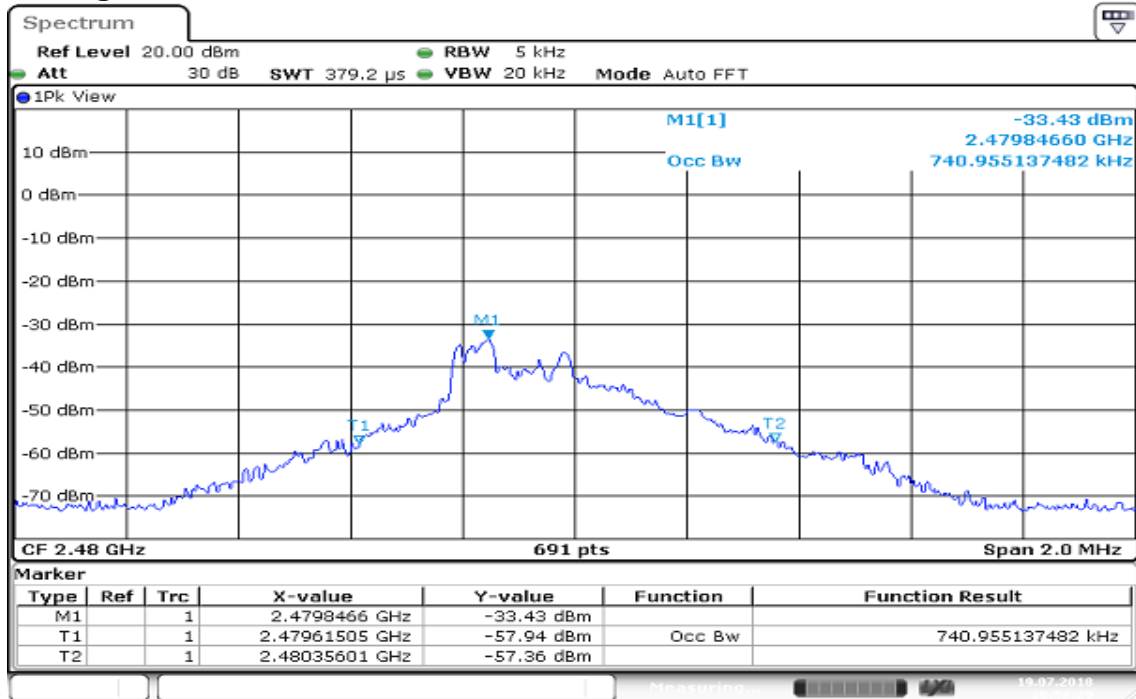
Date: 19 JUL 2018 10:57:13



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## CH High



Date: 19 JUL 2018 10:58:29

## 9.2 BAND EDGES AND FUNDAMENTAL MEASUREMENT

### LIMIT

According to §15.209, §15.249(a)

According to RSS 210 B.10

(1) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

\* Field strength limits are specified at a distance of 3 meters

Fundamental Limit Conversion		
Average (mV/m) at 3M	Average (dBuV/m) at 3M	Peak (dBuV/m) at 3M
50	93.98	113.98

Harmonic Limit Conversion		
Average (uV/m) at 3M	Average (dBuV/m) at 3M	Peak (dBuV/m) at 1M
500	53.97	73.97

\*(Limit=20LOG(500)=53.79 dBuV/m)

### Below 30 MHz

Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	30
1.705-30 MHz	30	30

Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

The diagram illustrates the experimental setup for measuring the radiation pattern of an EUT. The EUT is placed on a turntable at a height of 1.5m. The horn antenna is mounted on a tower at a height of 4m from the turntable. The horizontal distance between the EUT and the antenna is 3m. The spectrum analyzer is connected to the antenna via a pre-amplifier. The antenna is positioned at a height of 1m from the ground. The spectrum analyzer is connected to the antenna via a pre-amplifier.



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## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq 98\%$ , VBW=10Hz.  
if duty cycle  $< 98\%$  VBW=1/T.

About Test:

Configuration	Duty Cycle (%)	T(ms)	1/T (kHz)	VBW Setting
Ant+	4.40%	0.2700	3.704	3.9KHz

5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.
6. Result = Spectrum Reading + cable loss (spectrum to Amp) - Amp Gain + Cable loss (Amp to receive Ant)+ Receive Ant



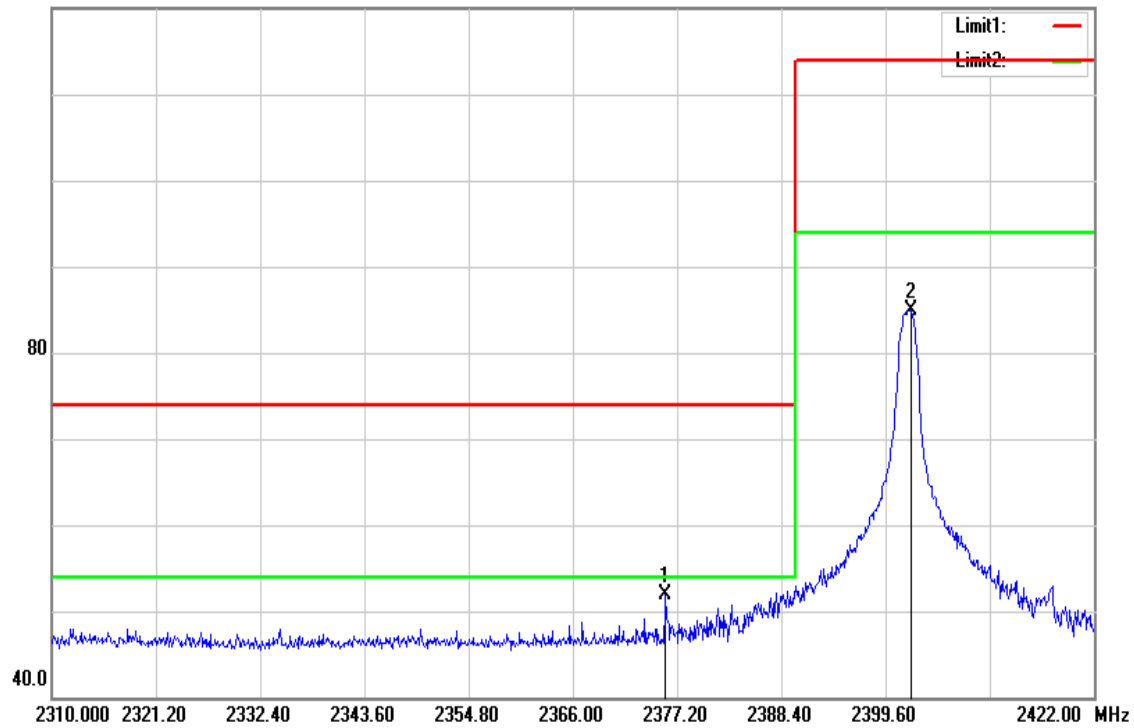
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### Band Edges (CH Low)

Detector mode: Peak

120.0 dBuV/m



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2375.968	54.85	-3.02	51.83	74.00	-22.17	peak
2	2402.288	87.86	-2.95	84.91	113.97	-29.06	peak

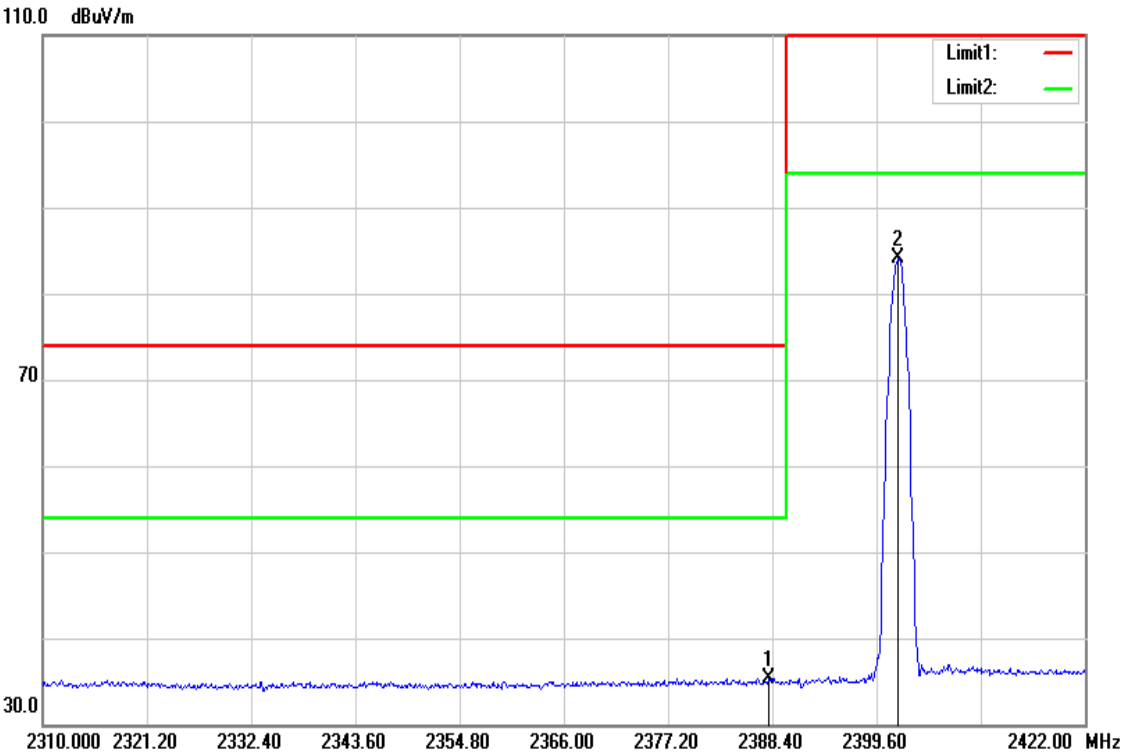




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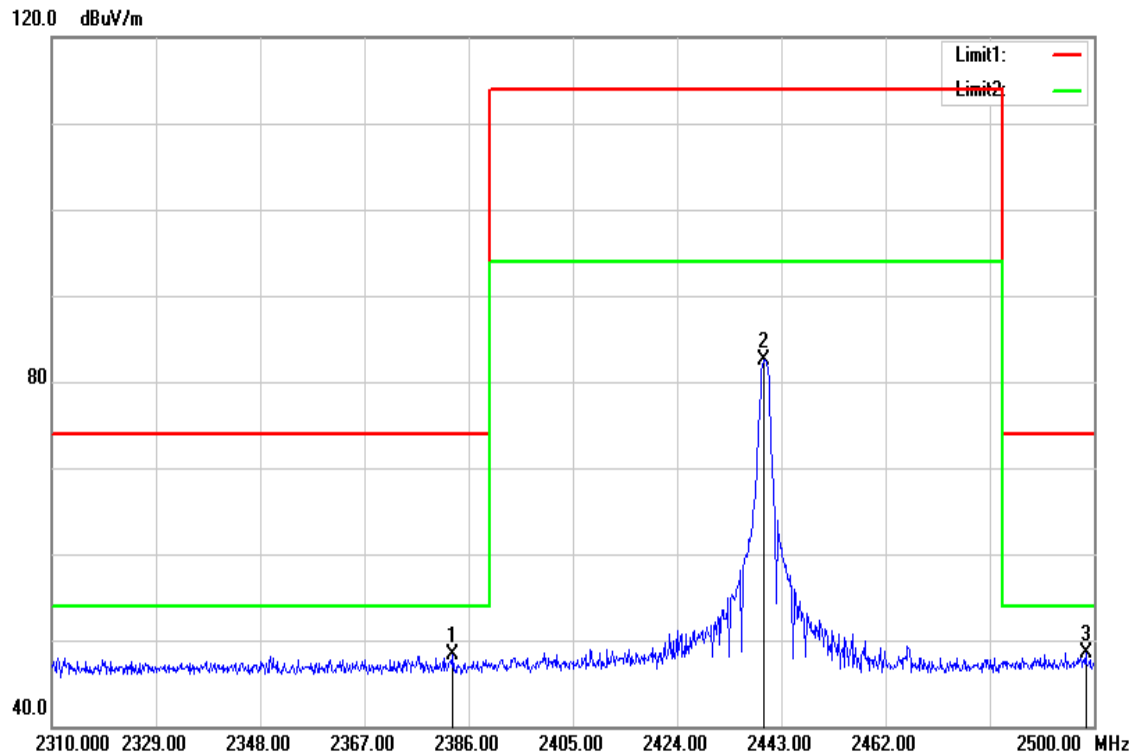
Detector mode: Average



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2388.064	38.35	-2.98	35.37	54.00	-18.63	AVG
2	2401.952	87.00	-2.95	84.05	93.97	-9.92	AVG

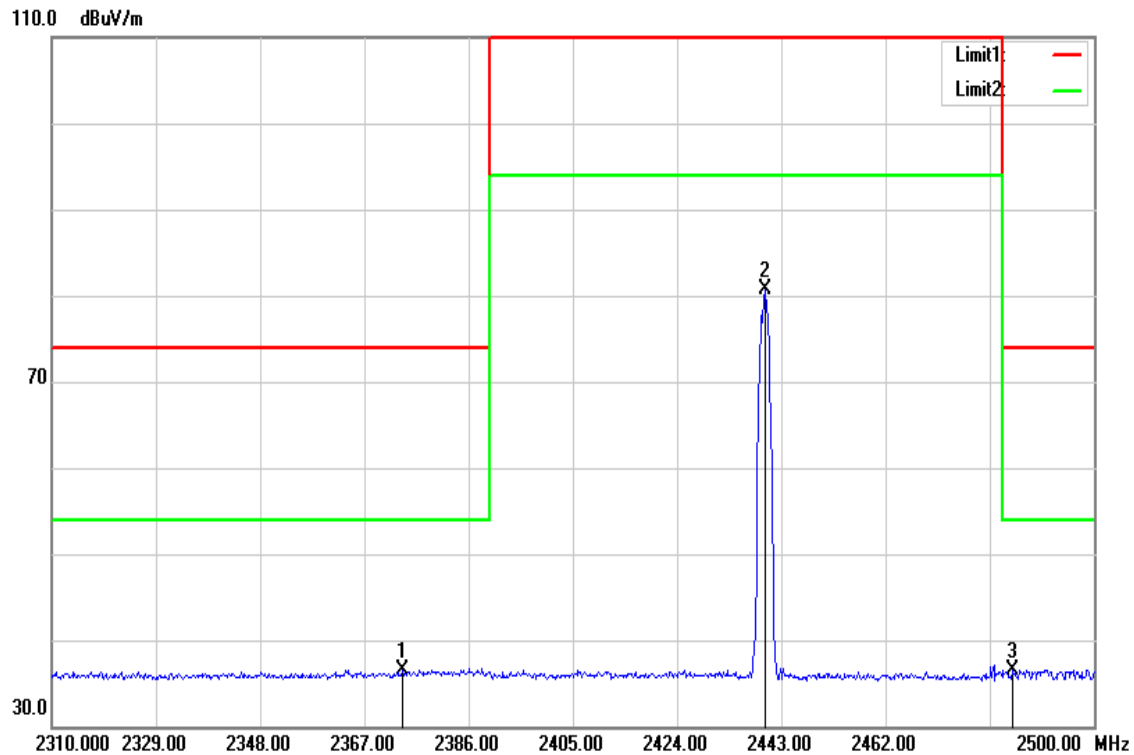
## Band Edges (CH Mid)

Detector mode: Peak



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2383.150	51.31	-3.00	48.31	74.00	-25.69	peak
2	2439.770	85.35	-2.83	82.52	113.97	-31.45	peak
3	2498.480	51.07	-2.64	48.43	74.00	-25.57	peak

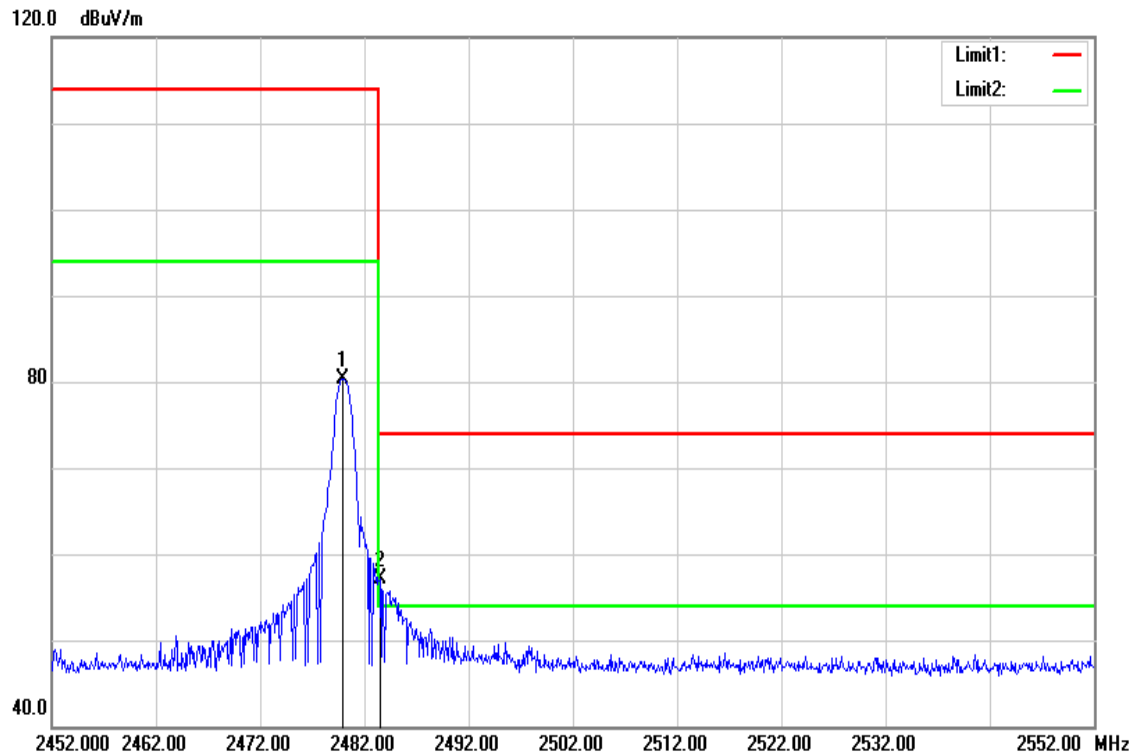
**Detector mode: Average**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2374.030	39.56	-3.04	36.52	54.00	-17.48	AVG
2	2440.150	83.54	-2.82	80.72	93.97	-13.25	AVG
3	2485.180	39.19	-2.69	36.50	54.00	-17.50	AVG

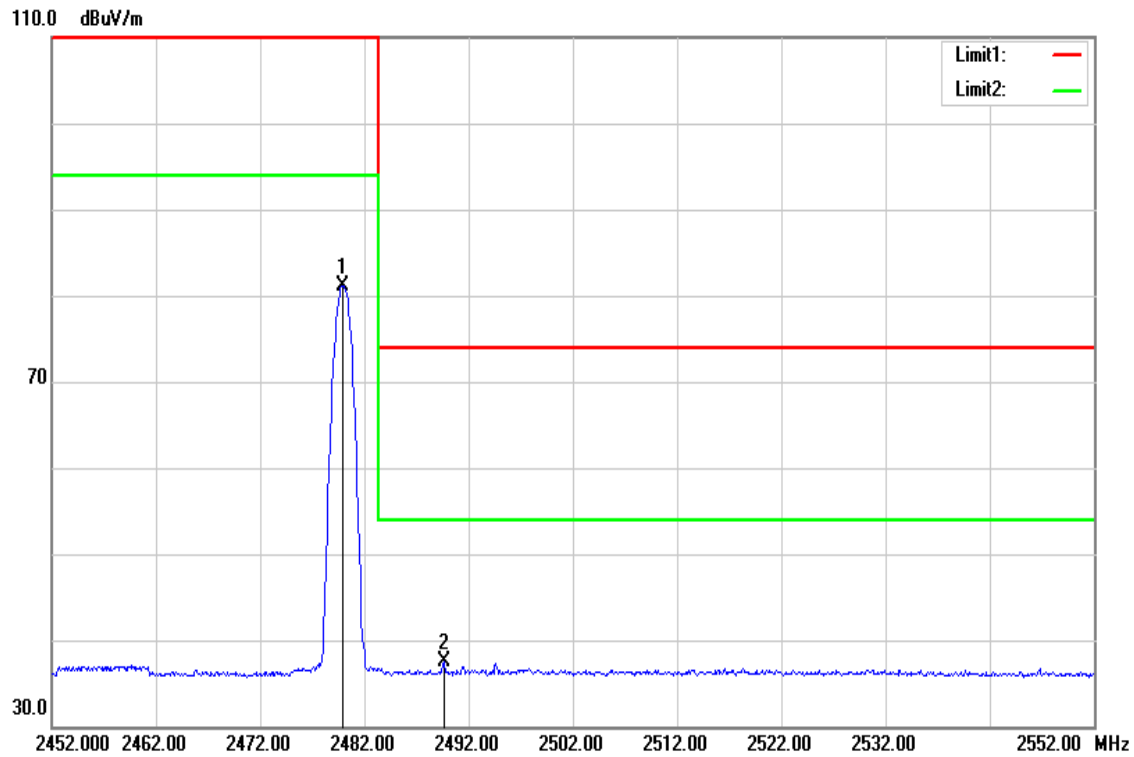
## Band Edges (CH High)

Detector mode: Peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.900	82.96	-2.70	80.26	113.97	-33.71	peak
2	2483.500	59.72	-2.69	57.03	74.00	-16.97	peak

**Detector mode: Average**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.900	83.90	-2.70	81.20	93.97	-12.77	AVG
2	2489.600	40.08	-2.67	37.41	54.00	-16.59	AVG

### 9.3 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

#### LIMIT

According to §15.249(d) and RSS-210 F.1,

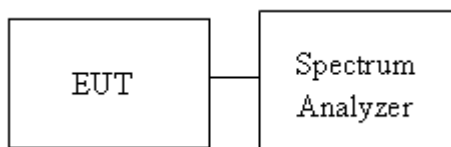
In any 100 kHz bandwidth outside the authorized frequency band,

Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

#### TEST PROCEDURE

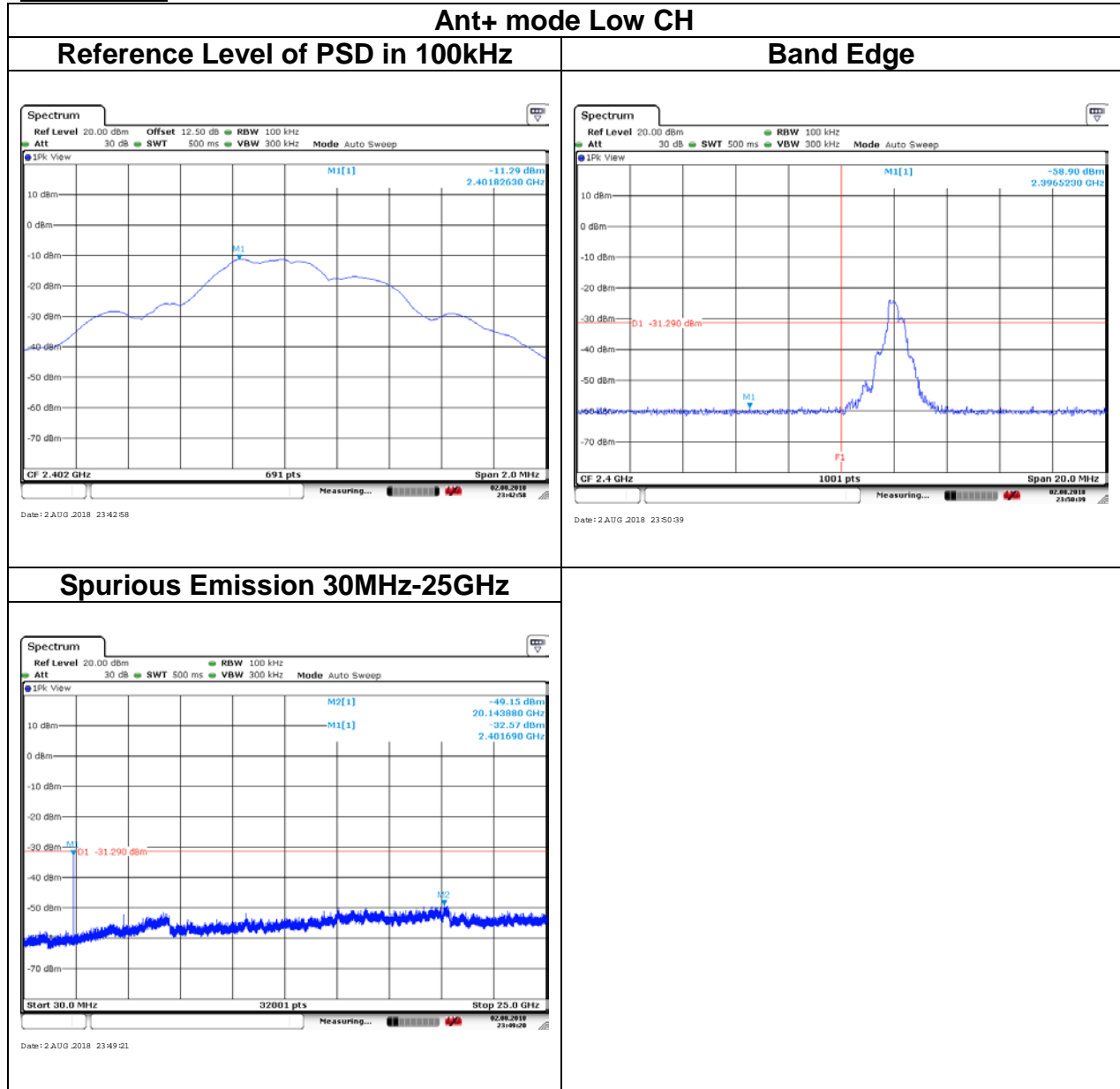
1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

#### TEST SETUP



## TEST RESULT

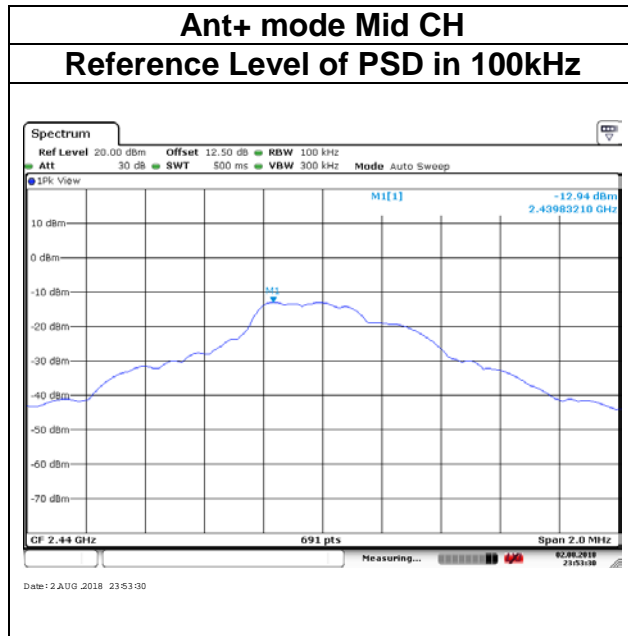
### Test Data



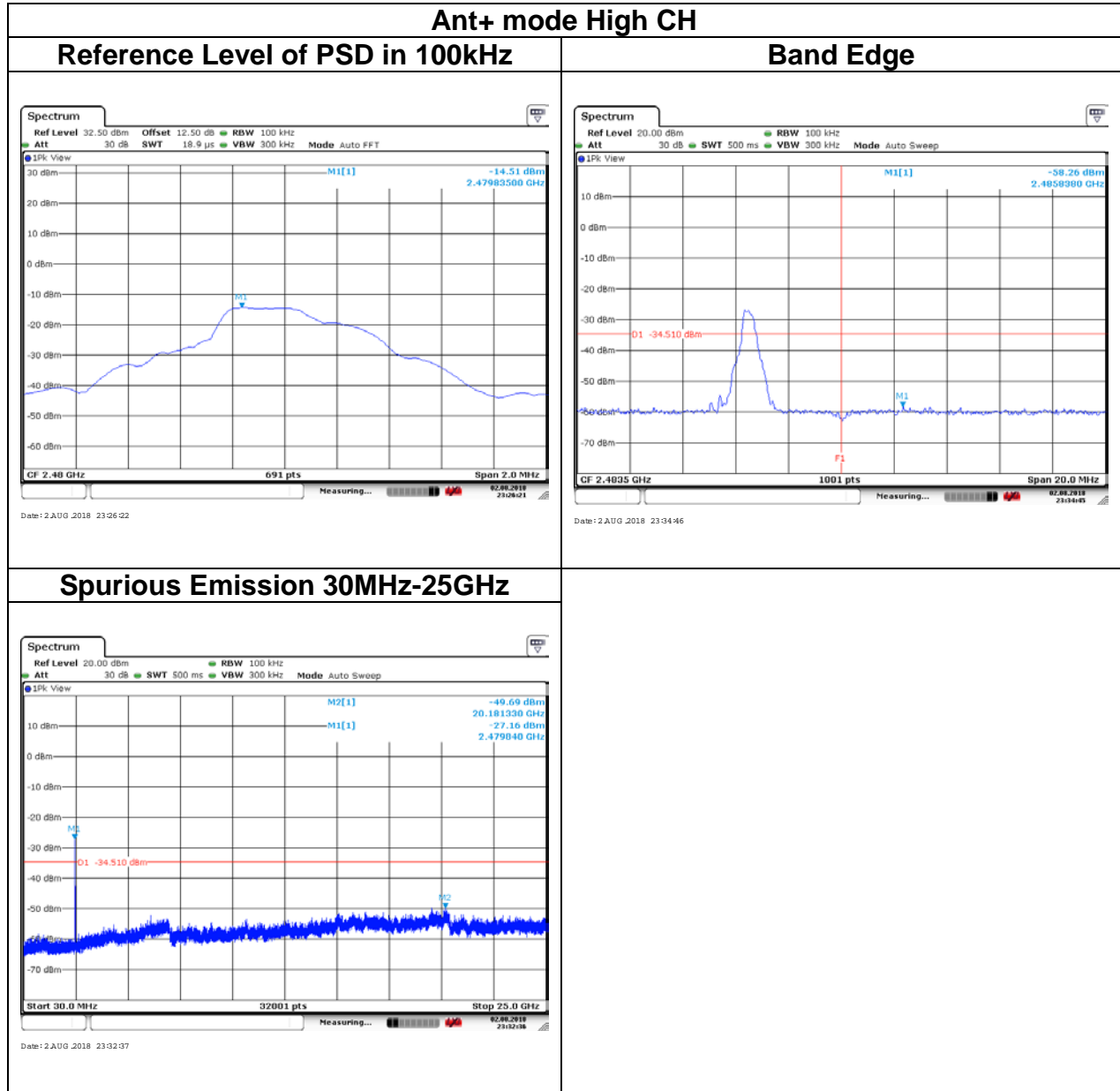


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## 9.4 RADIATION BANDEDGE AND SPURIOUS EMISSION

### LIMIT

According to §15.209, §15.249(a)

According to RSS 210 §B.10

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209(follow the table), whichever is the lesser attenuation

### Below 30 MHz

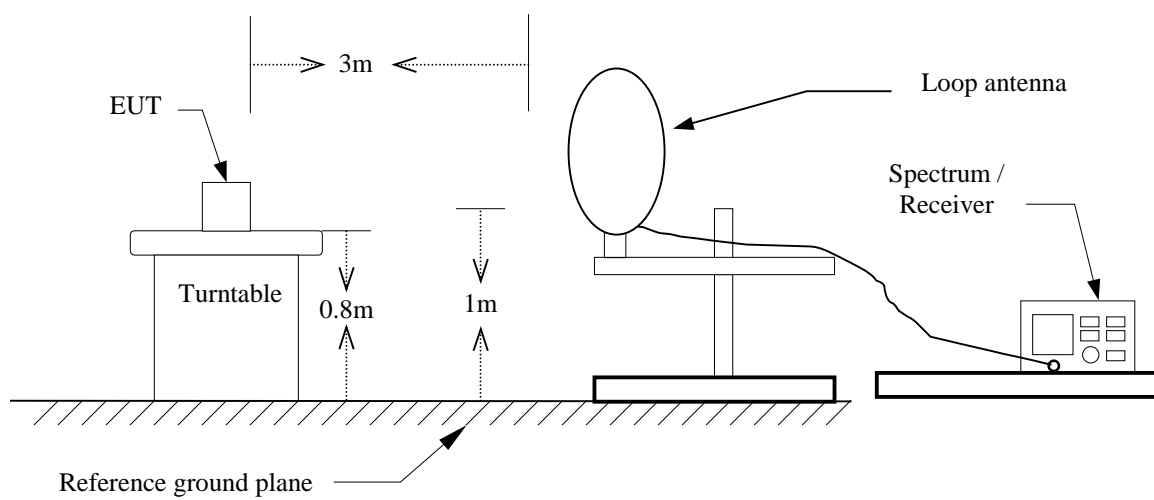
Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	30
1.705-30 MHz	30	30

### Above 30 MHz

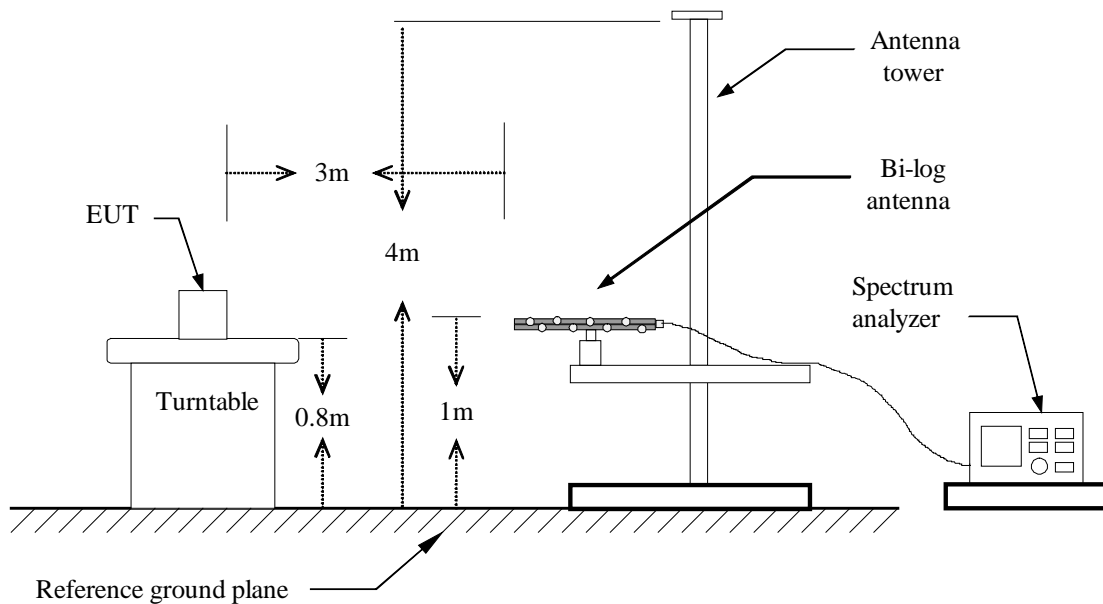
Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

## Test Configuration

9kHz ~ 30MHz



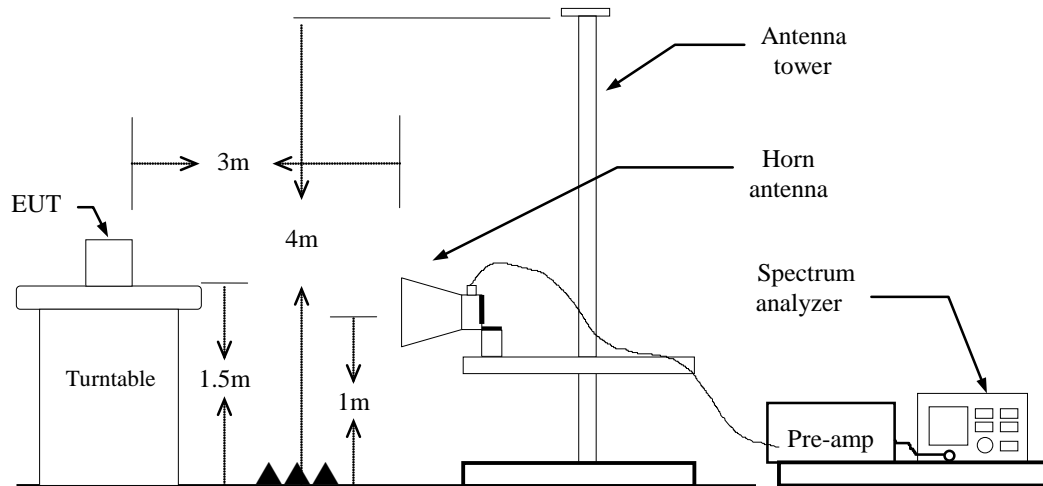
30MHz ~ 1GHz



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**Above 1 GHz**

**TEST PROCEDURE**

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m high and below 1 GHz is 0.8m high above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz,

if duty cycle  $\geq 98\%$ , VBW=10Hz.

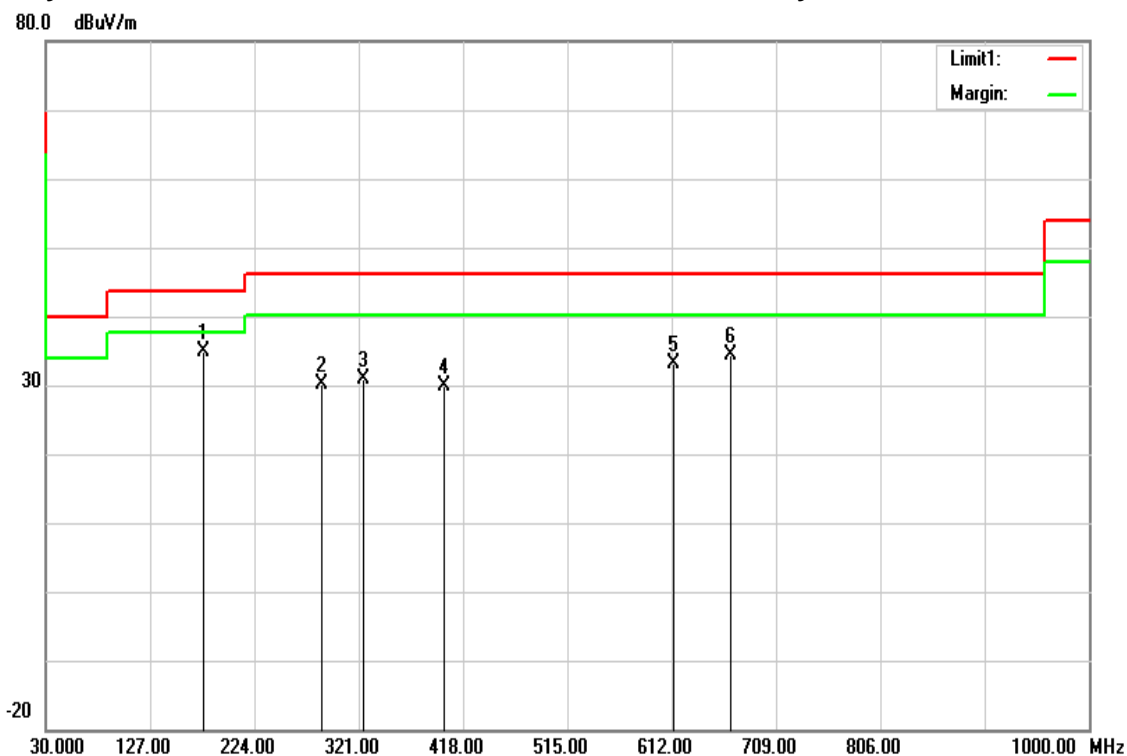
if duty cycle  $< 98\%$  VBW=1/T.

**About test**

Configuration	Duty Cycle (%)	T(ms)	1/T (kHz)	VBW Setting
Ant+	4.02%	0.2464	4.058	3.9KHz

7. Repeat above procedures until the measurements for all frequencies are complete.
8. Result = Spectrum Reading + cable loss (spectrum to Amp) - Amp Gain + Cable loss (Amp to receive Ant) + Receive Ant

**Note:** We checked every harmonics frequencies from Fundamental frequencies with reduced VBW, and we mark a point to prove pass or not if we find any emission. For this case, there are no emissions hidden in the noise floor.

**Below 1 GHz****Operation Mode:** Normal Link**Test Date:** September 13, 2018**Temperature:** 22.3°C**Tested by:** Jerry Chuang**Humidity:** 41% RH**Polarity:** Ver.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
176.4700	45.27	-10.34	34.93	43.52	-8.59	peak	V
287.0500	37.68	-7.66	30.02	46.02	-16.00	peak	V
324.8800	37.73	-6.85	30.88	46.02	-15.14	peak	V
400.5400	34.65	-4.78	29.87	46.02	-16.15	peak	V
613.9400	33.43	-0.24	33.19	46.02	-12.83	peak	V
667.2900	33.79	0.68	34.47	46.02	-11.55	peak	V

**Remark:**

- No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
- Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
- Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

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Operation Mode: Normal Link

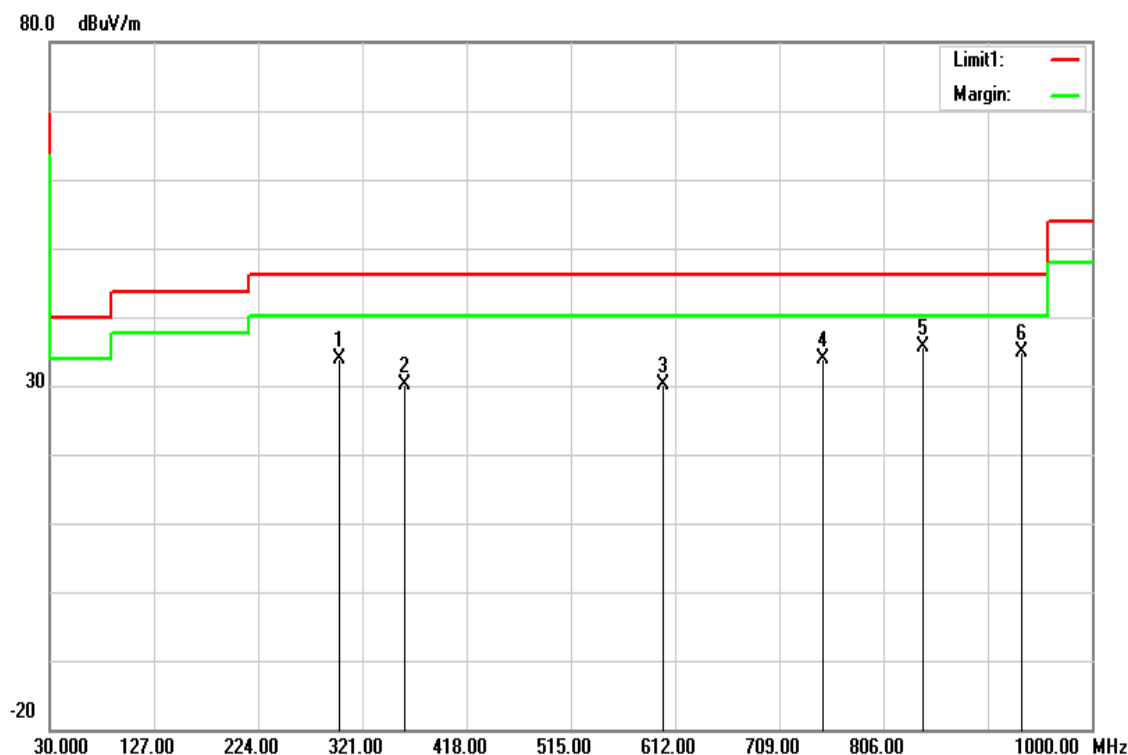
Test Date: September 13, 2018

Temperature: 22.3°C

Tested by: Jerry Chuang

Humidity: 41% RH

Polarity: Hor.



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
299.6600	41.44	-7.51	33.93	46.02	-12.09	peak	H
359.8000	36.00	-5.77	30.23	46.02	-15.79	peak	H
600.3600	30.93	-0.79	30.14	46.02	-15.88	peak	H
749.7400	31.73	2.03	33.76	46.02	-12.26	peak	H
842.8600	31.80	3.80	35.60	46.02	-10.42	peak	H
935.0100	29.78	5.02	34.80	46.02	-11.22	peak	H

#### Remark:

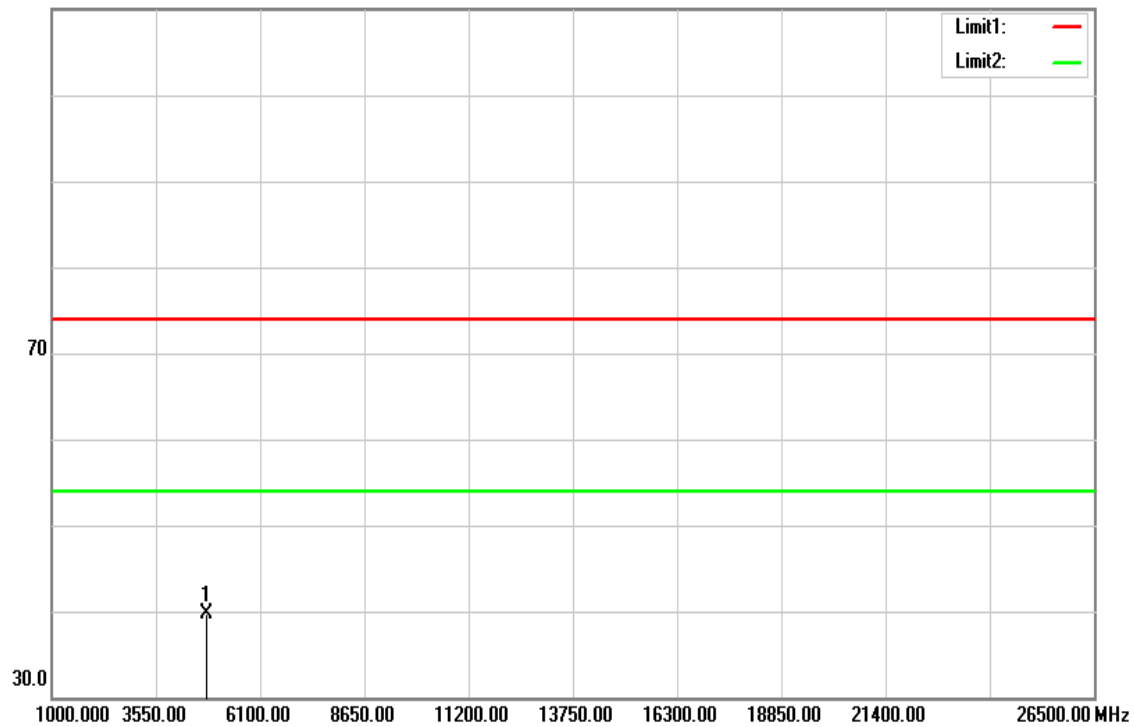
- No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
- Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
- Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



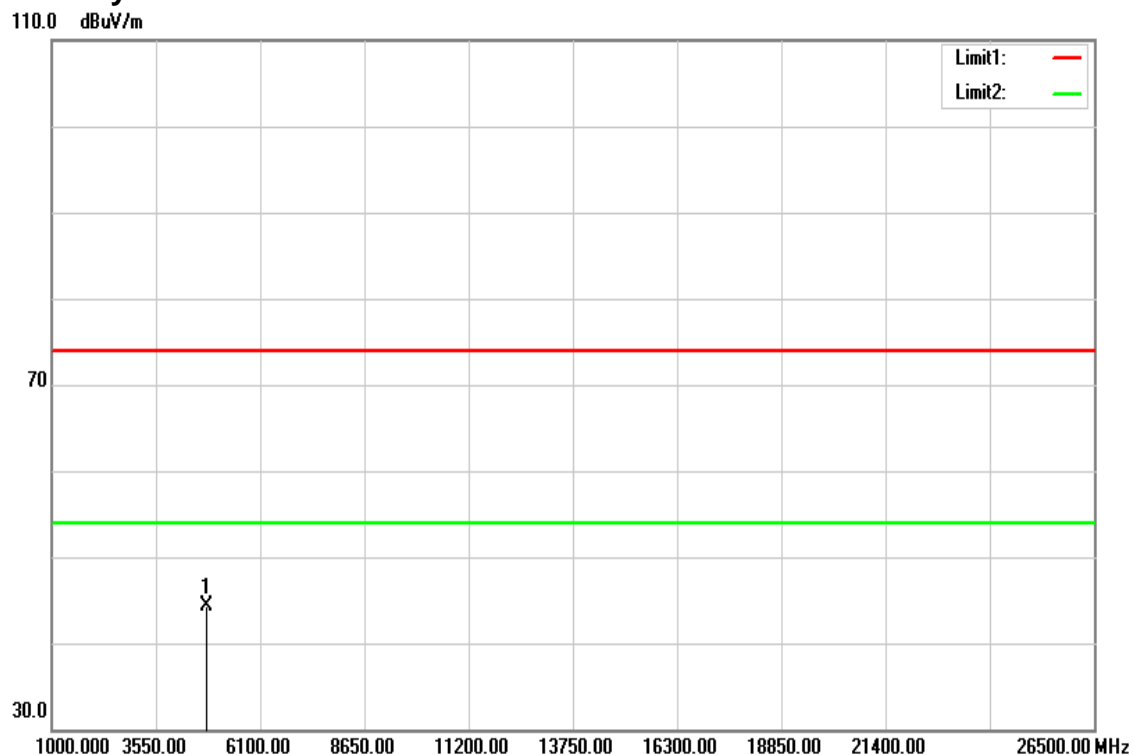
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**Above 1 GHz**  
**TX / CH Low**  
**Polarity: Vertical**  
110.0 dBuV/m



**Polarity: Horizontal**







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### Above 1 GHz

**Operation Mode:** Tx / CH Low

**Test Date:** September 13, 2018

**Temperature:** 22.3°C

**Tested by:** Jerry Chuang

**Humidity:** 41% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
4804.000	36.51	3.09	39.60	74.00	-34.40	peak	V
N/A							
4804.000	41.31	3.09	44.40	74.00	-29.60	peak	H
N/A							

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Result (dBuV/m) – limit (dBuV/m).



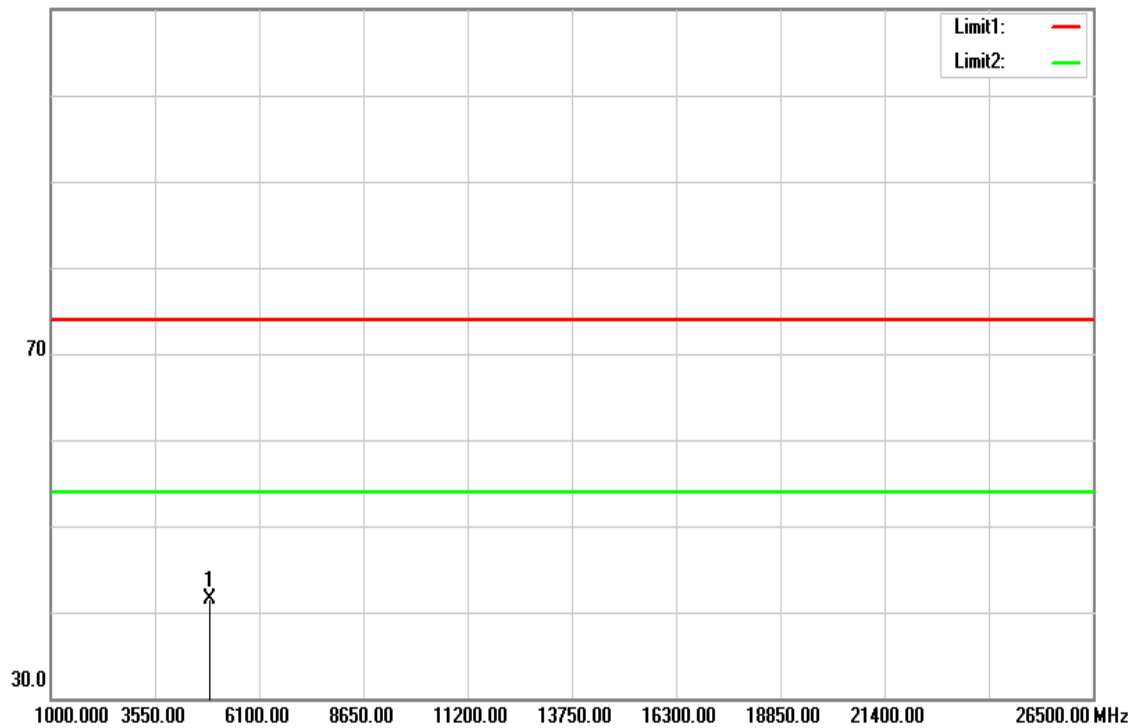
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### TX / CH Mid

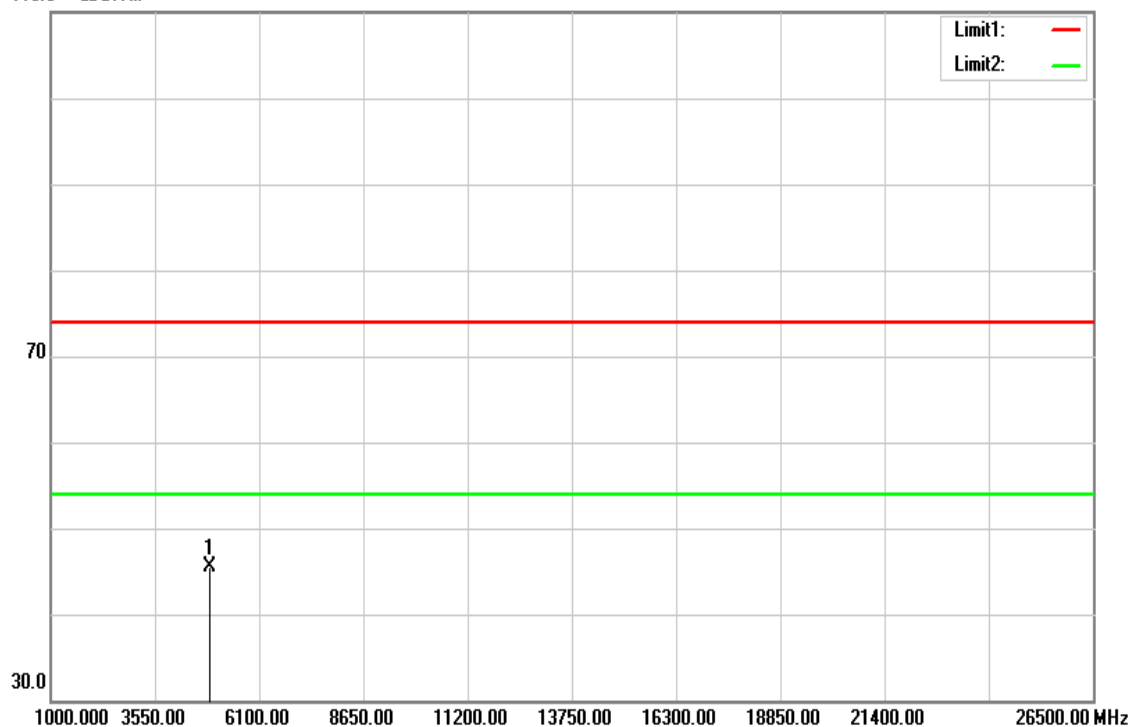
**Polarity: Vertical**

110.0 dBuV/m



**Polarity: Horizontal**

110.0 dBuV/m





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Operation Mode: Tx / CH Mid

Test Date: September 13, 2018

Temperature: 22.3°C

Tested by: Jerry Chuang

Humidity: 41% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
4880.000	37.85	3.60	41.45	74.00	-32.55	peak	V
N/A							
4880.000	41.83	3.60	45.43	74.00	-28.57	peak	H
N/A							

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5.  $\text{Margin (dB)} = \text{Result (dBuV/m)} - \text{limit (dBuV/m)}$ .



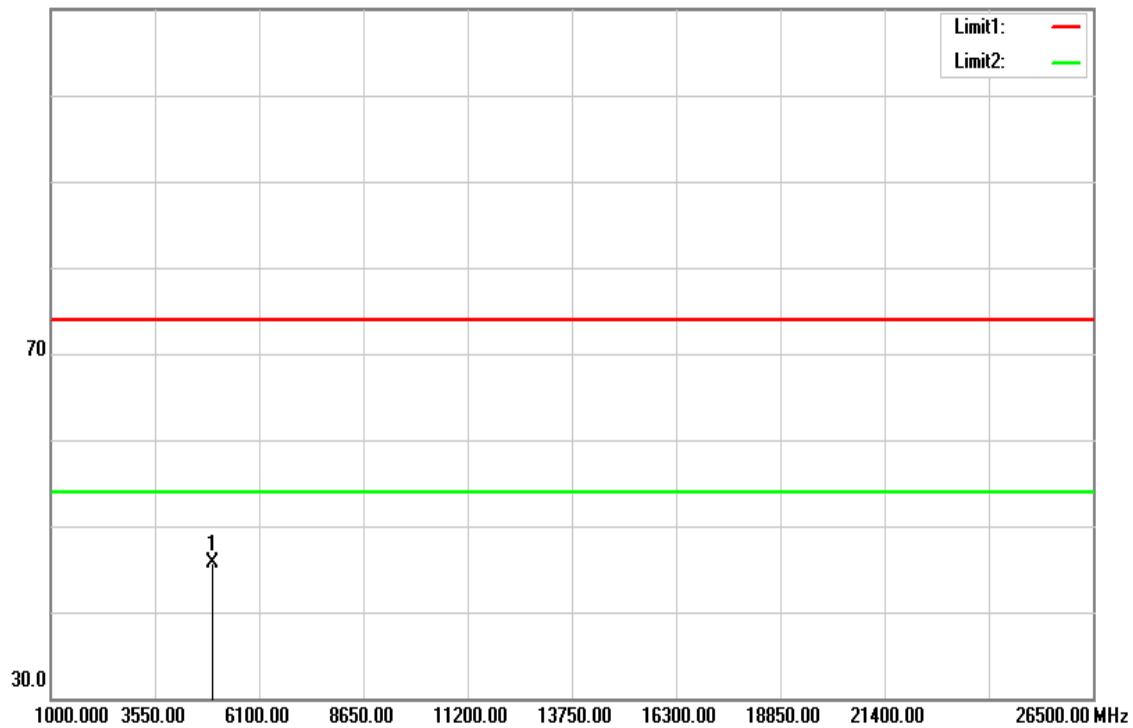
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### TX / CH High

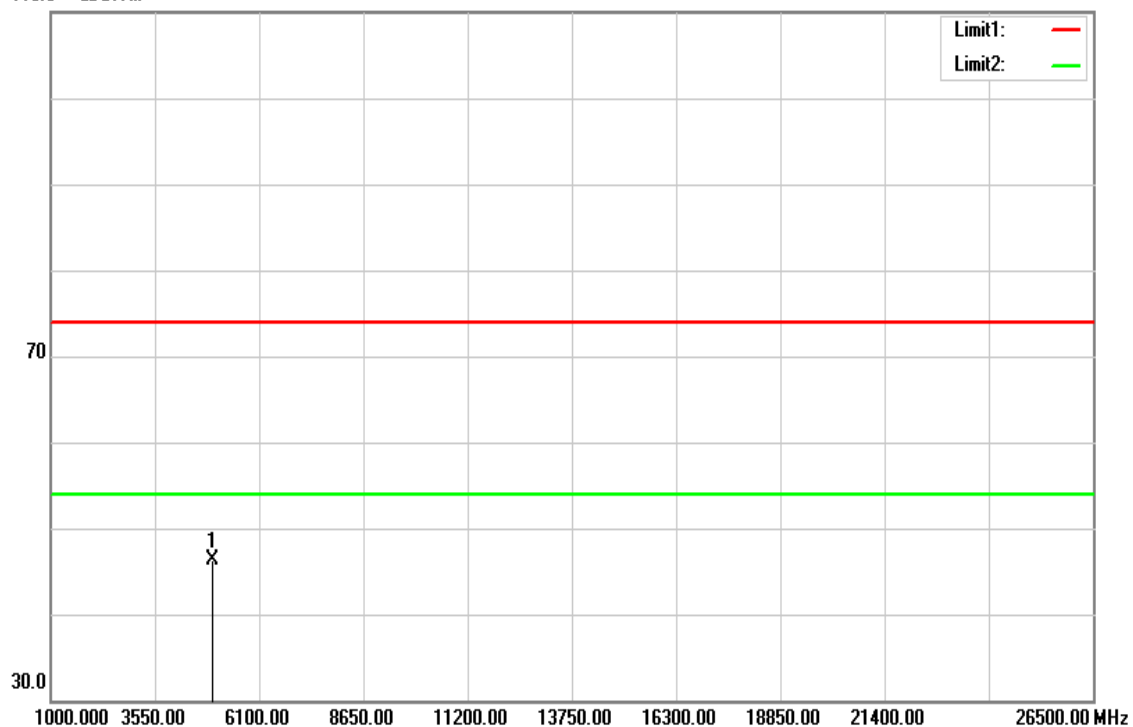
**Polarity: Vertical**

110.0 dBuV/m



**Polarity: Horizontal**

110.0 dBuV/m





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Operation Mode: Tx / CH High

Test Date: September 13, 2018

Temperature: 22.3°C

Tested by: Jerry Chuang

Humidity: 41% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
4960.000	41.57	4.14	45.71	74.00	-28.29	peak	V
N/A							
4960.000	42.18	4.14	46.32	74.00	-27.68	peak	H
N/A							

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Result (dBuV/m) – limit (dBuV/m).

## 9.5 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a)(2) and RSS-GEN section 8.8, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

### Test Configuration

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### TEST PROCEDURE

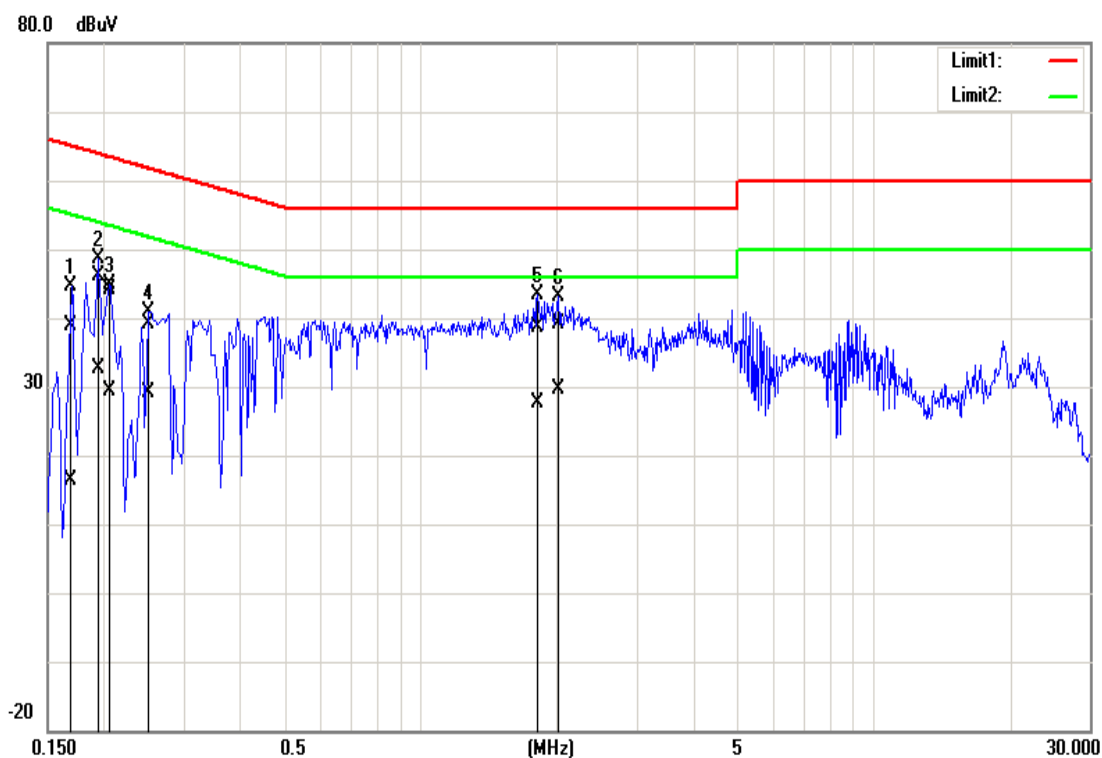
1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

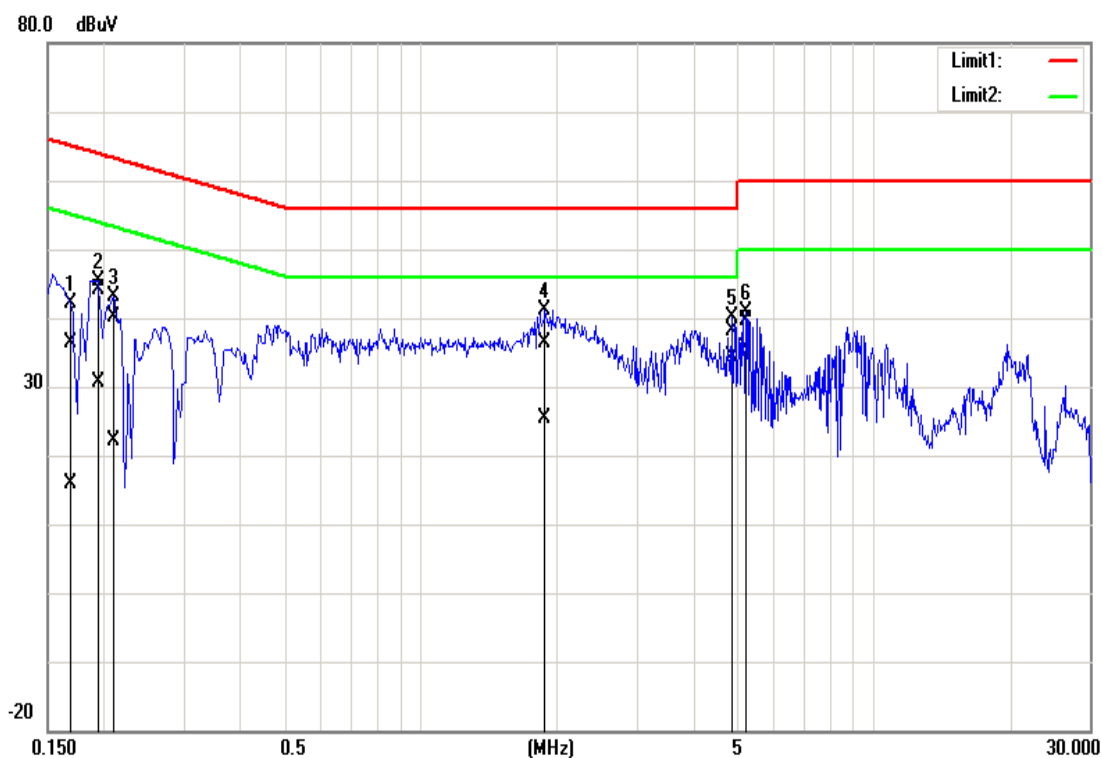
### Test Data

Test Mode:	Mode 2	Temp/Hum	24(°C)/ 50%RH
Phase:	Line	Test Date	2018/07/23
		Test Engineer	Dally Hong



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1700	38.86	16.21	0.11	38.97	16.32	64.96	54.96	-25.99	-38.64	Pass
2	0.1940	45.91	32.52	0.11	46.02	32.63	63.86	53.86	-17.84	-21.23	Pass
3	0.2060	43.95	29.39	0.11	44.06	29.50	63.37	53.37	-19.31	-23.87	Pass
4	0.2500	38.97	29.05	0.11	39.08	29.16	61.76	51.76	-22.68	-22.60	Pass
5	1.8180	38.55	27.47	0.15	38.70	27.62	56.00	46.00	-17.30	-18.38	Pass
6	2.0220	39.05	29.47	0.15	39.20	29.62	56.00	46.00	-16.80	-16.38	Pass

Test Mode:	Mode 2	Temp/Hum	24(°C)/ 50%RH
Phase:	Neutral	Test Date	2018/07/23
		Test Engineer	Dally Hong



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1700	36.18	15.74	0.14	36.32	15.88	64.96	54.96	-28.64	-39.08	Pass
2	0.1940	44.01	30.41	0.13	44.14	30.54	63.86	53.86	-19.72	-23.32	Pass
3	0.2100	40.11	21.88	0.13	40.24	22.01	63.21	53.21	-22.97	-31.20	Pass
4	1.8820	36.10	25.27	0.16	36.26	25.43	56.00	46.00	-19.74	-20.57	Pass
5	4.8580	37.80	34.26	0.21	38.01	34.47	56.00	46.00	-17.99	-11.53	Pass
6	5.2420	39.35	35.53	0.22	39.57	35.75	60.00	50.00	-20.43	-14.25	Pass

--End of Report--